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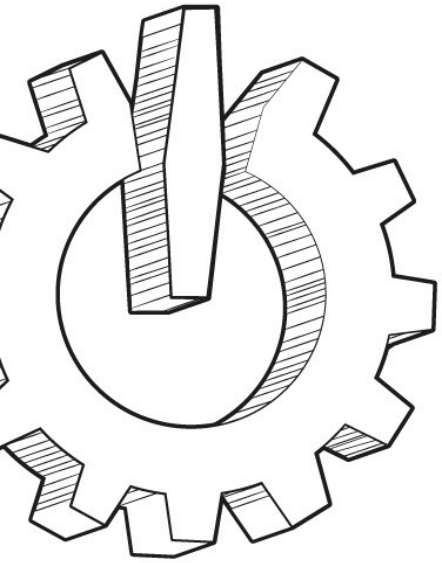

From the idea to the prototype using FLOSS

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02/03/2019

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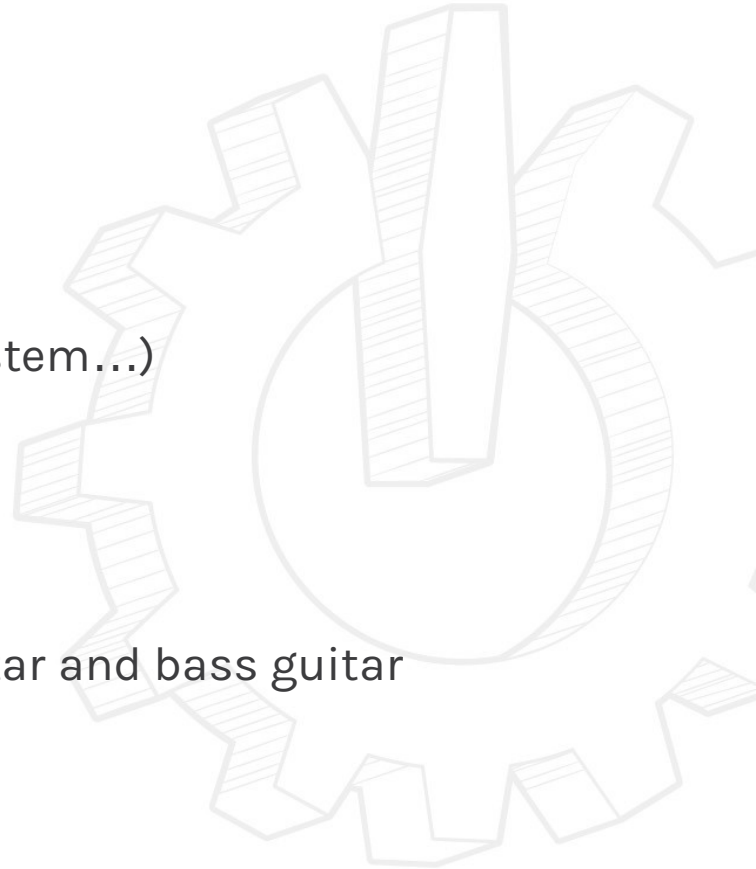
Who am I?

- Software Engineer at Collabora
  - Low-level development (kernel, bootloader, base system…)
  - Embedded software
- Formerly owner of A-wai Amplification
  - Designed & crafted custom tube amplifiers for guitar and bass guitar
  - First real-world experience with electronics design



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From the idea to the prototype using FLOSS

- Testing & validating your idea
- Designing the PCB
- A case for your project

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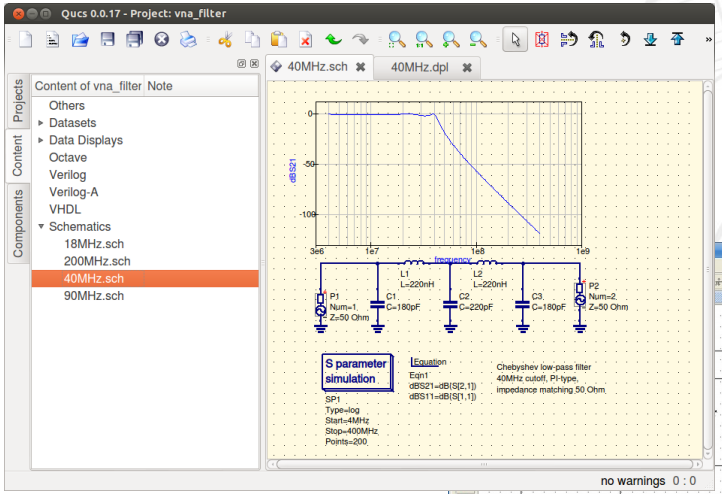
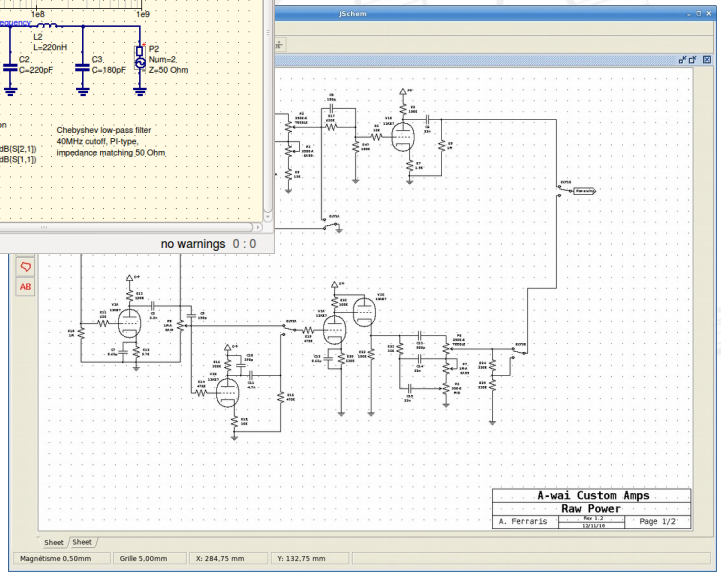
Testing & validating your idea

Testing & validating your idea

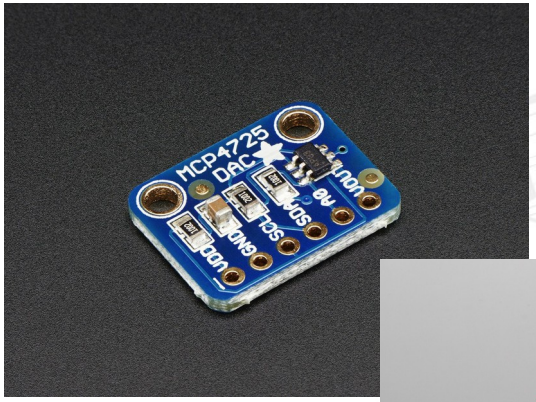
- Innovative idea
  - Can it work?
  - Will it work?
- When in doubt, simulate!
  - Qucs http://qucs.sourceforge.net/
  - Ngspice http://ngspice.sourceforge.net/
- Draft schematics
  - Good old paper
  - JSchem http://jschem.bplaced.net/

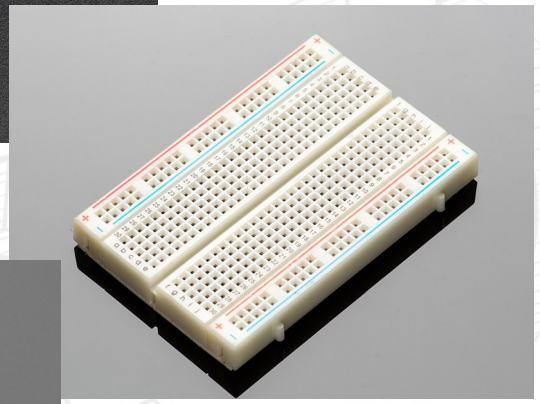


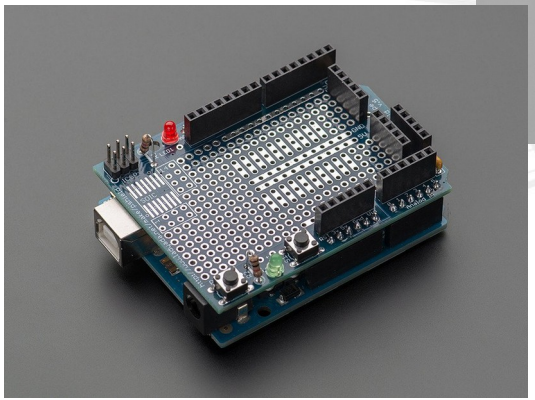


Proof of Concept

- Off-the-shelf modules
  - Adafruit
  - Sparkfun
  - Seeedstudio
- Breadboard
- Prototype shield





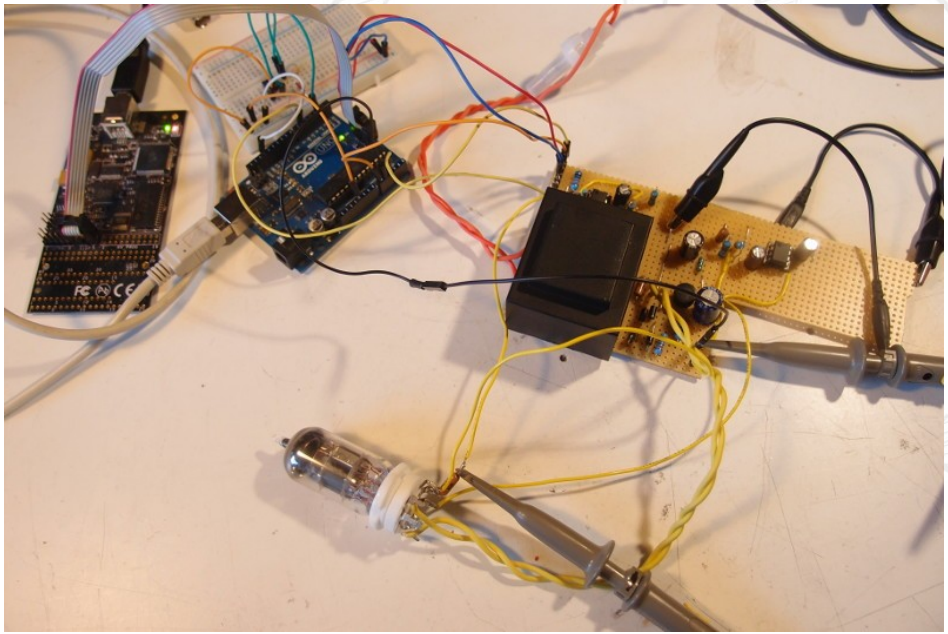


Components selection

- Widely available
- Available, comprehensive and correct datasheets
- Sufficient performances
- Though-hole mounting

The proto-prototype

- Validate global hardware design
- Lots of trial & error
  - Modification-friendly platform
- Not a prototype yet
  - Quite ugly
  - Fragile
  - Dangerous



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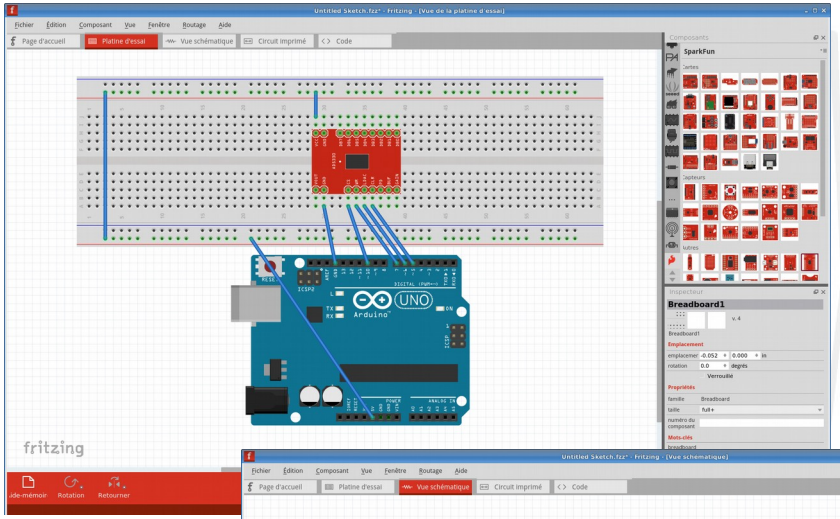
Designing the PCB

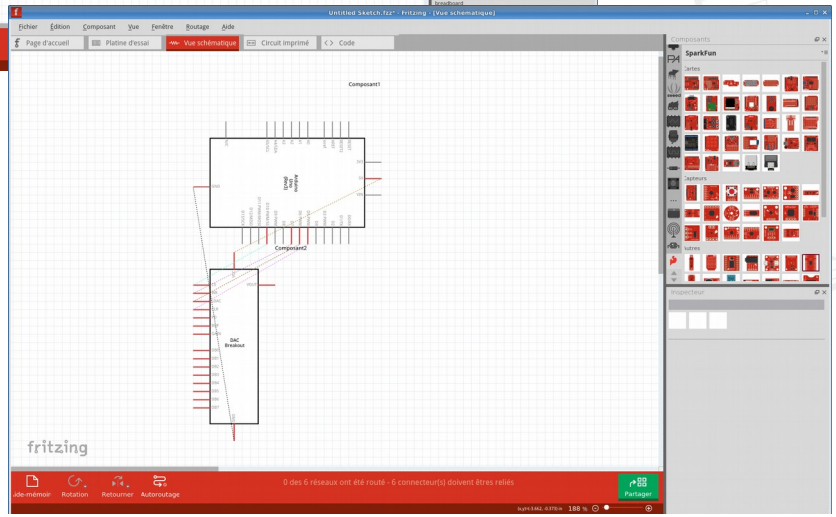
PCB design tools

- Proprietary software were mandatory for a long time
- 2 big FLOSS suites
  - KiCAD http://kicad-pcb.org/
  - Fritzing http://fritzing.org/

Fritzing

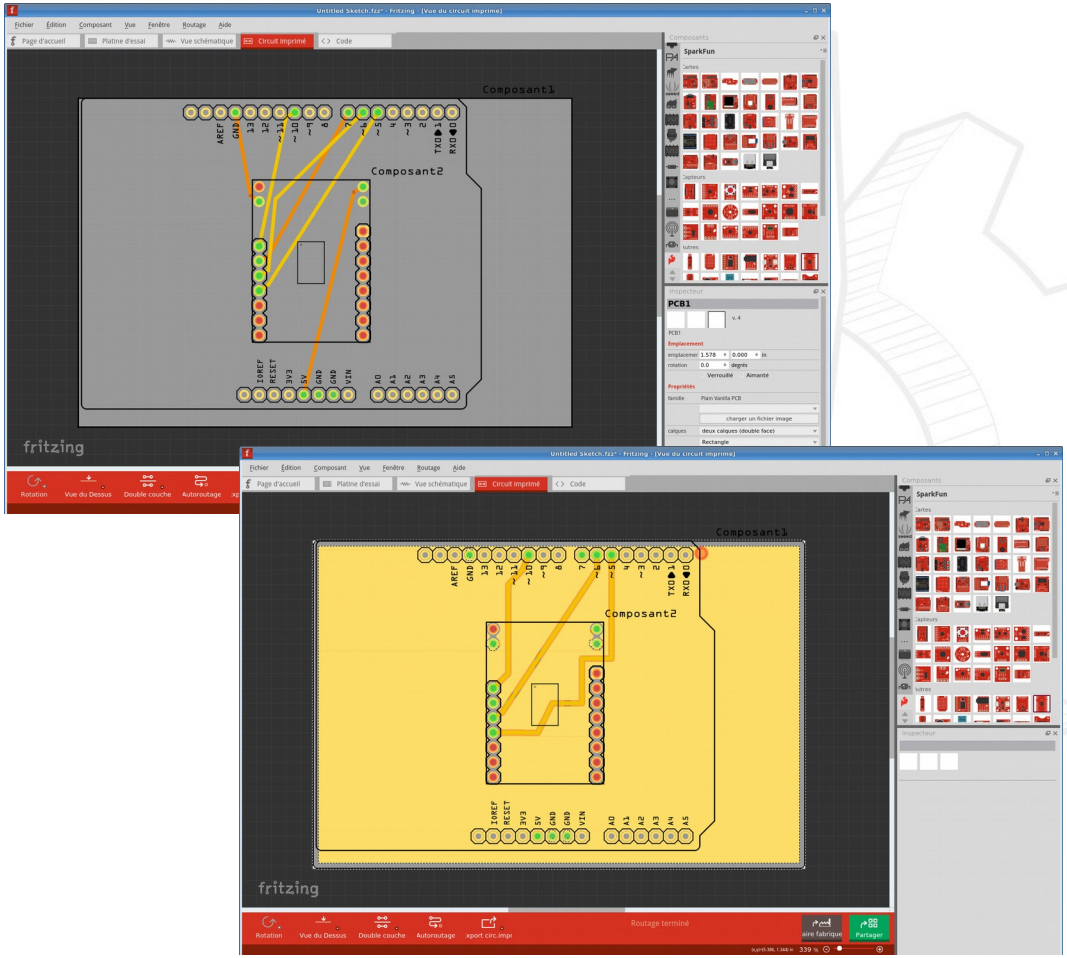
- The most recent (2008)
- “Maker”-oriented
- Pros :
  - Fully integrated (includes an Arduino IDE!)
  - User-friendly interface
  - Multiple design modes (breadboard, PCB…)
  - Arduino, Raspberry Pi & Sparkfun modules in the default library





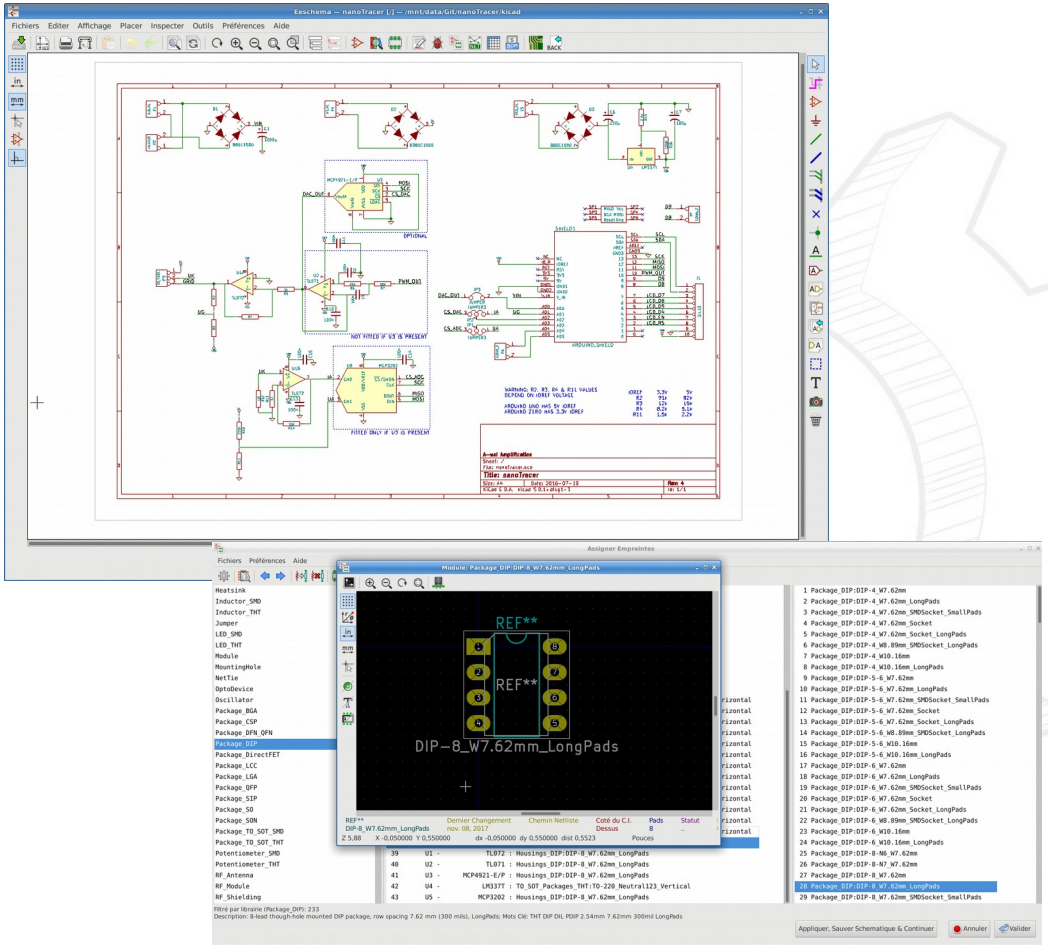
Fritzing

- Cons
  - Limited library: only popular components & modules
  - New model creation is quite complex
  - Difficult to use for complex and/or exotic projects



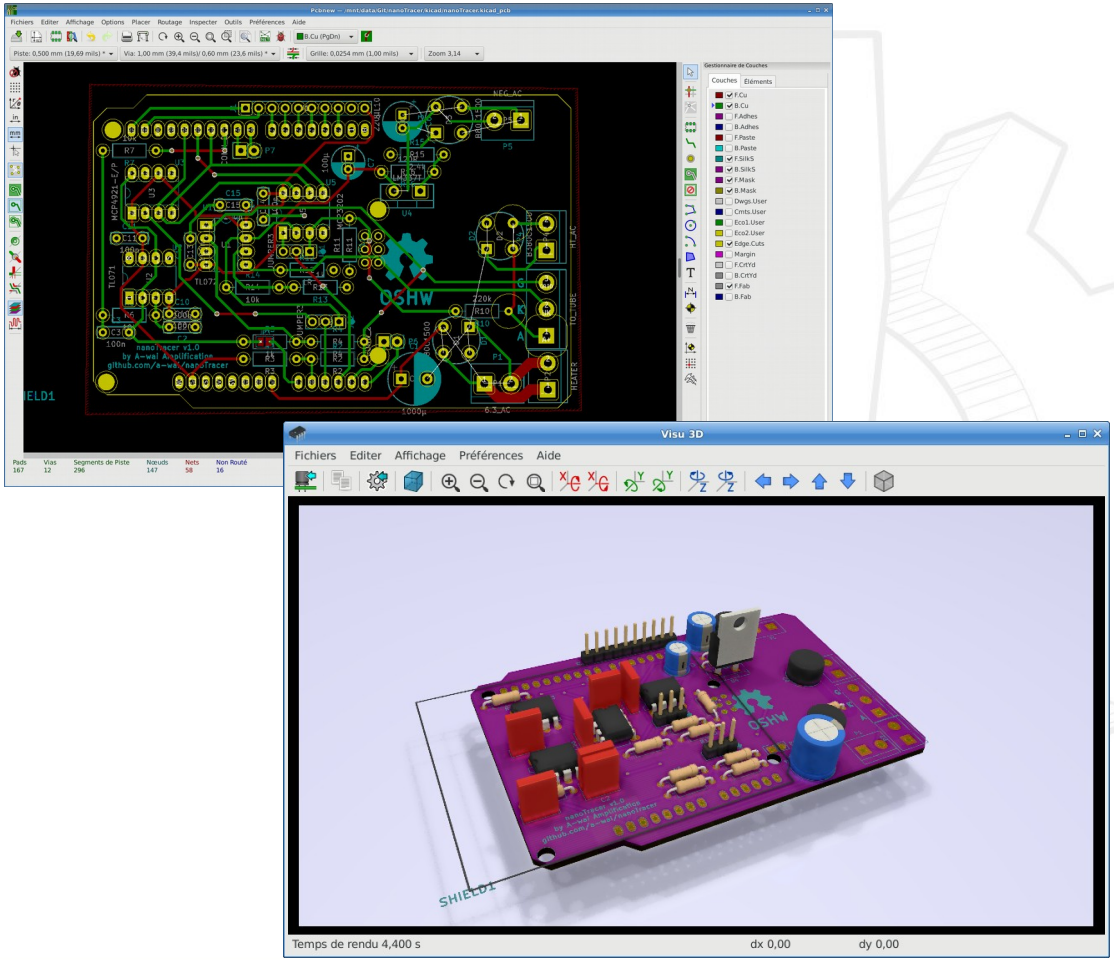
KiCAD

- The elder (1992), and the most widely used (Olimex, Purism…)
- 2 main software (eeschema & pcbnew) + useful tools
- Pros:
  - Very actively maintained (CERN)
  - Comprehensive libraries
  - Advanced routing
  - Simulation (SPICE), 3D previews



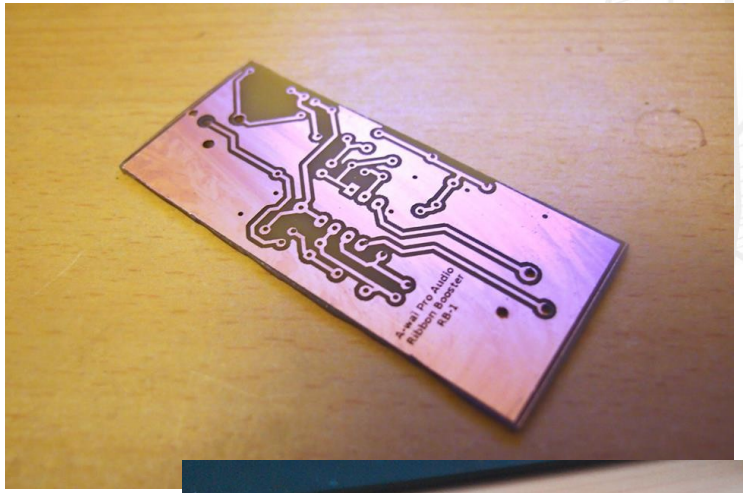
KiCAD

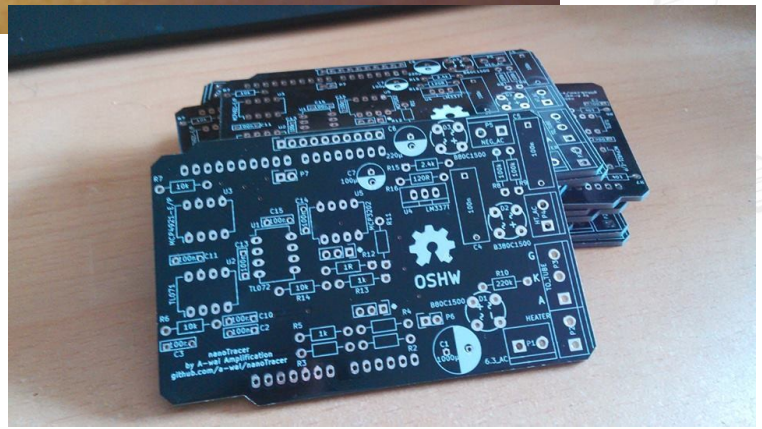
- Cons:
  - Not really user-friendly (mouse wheel, keyboard shortcuts…)
  - No user interface coherency
  - Insufficient communication between softwares



PCB manufacturing

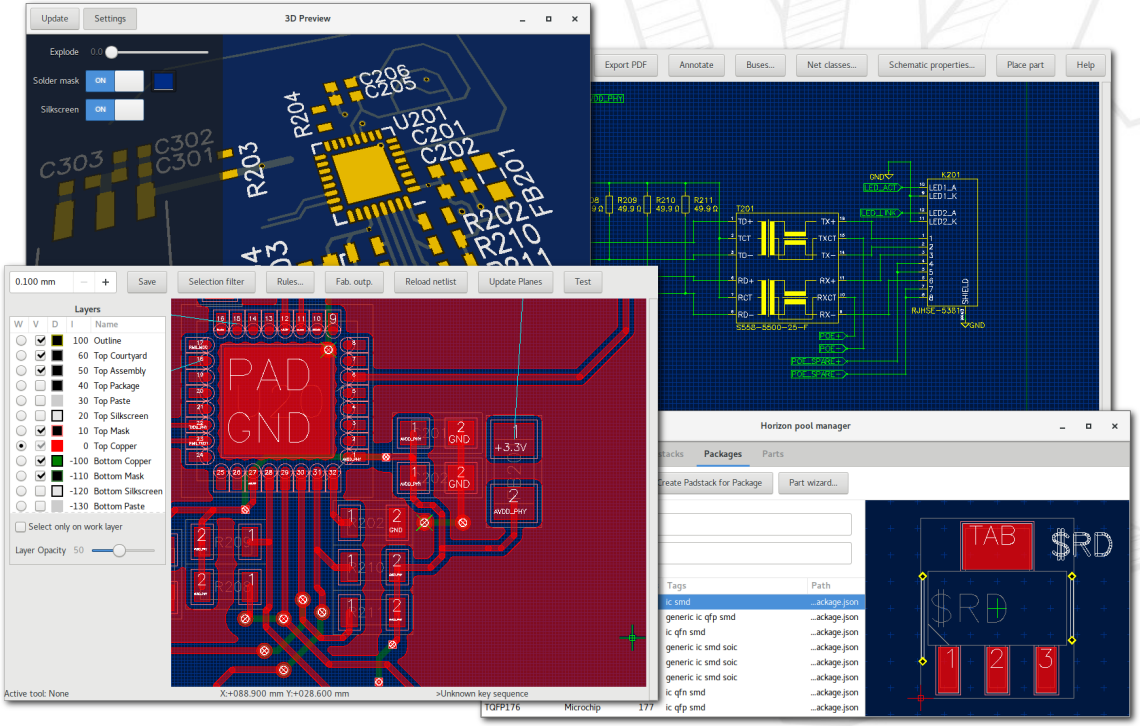
- At home
  - Need specific equipment and space
  - Requires using toxic products
  - Double-sided boards and/or thin tracks are tricky to manage
- Professional manufacturing
  - Cheap for small PCBs
  - Minimum order of 5 to 10 units
  - Lots of manufacturers to choose from → https://pcbshopper.com





Other useful software

- Horizon https://github.com/carrotIndustries/horizon
  - Modern EDA with a recent codebase
  - Uses KiCAD's router!
- gEDA http://www.geda-project.org/
  - Seems to be lagging behing KiCAD
- Visolate https://github.com/Traumflug/Visolate
  - Original take on PCB manufacturing
  - No longer maintained



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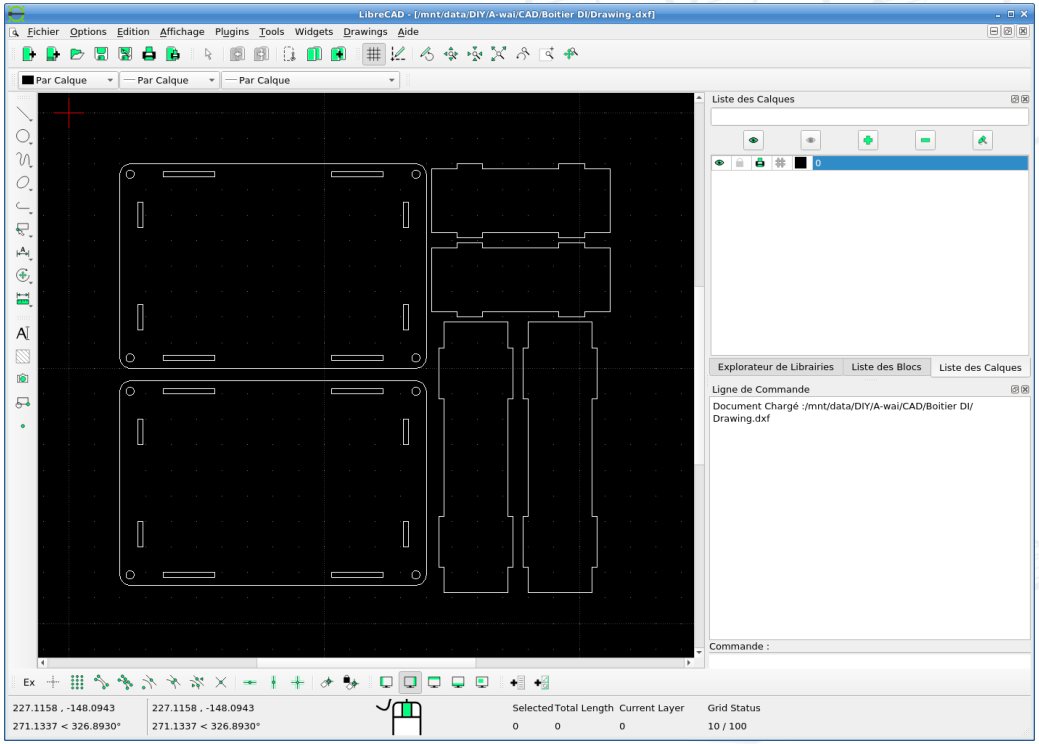
A case for your project

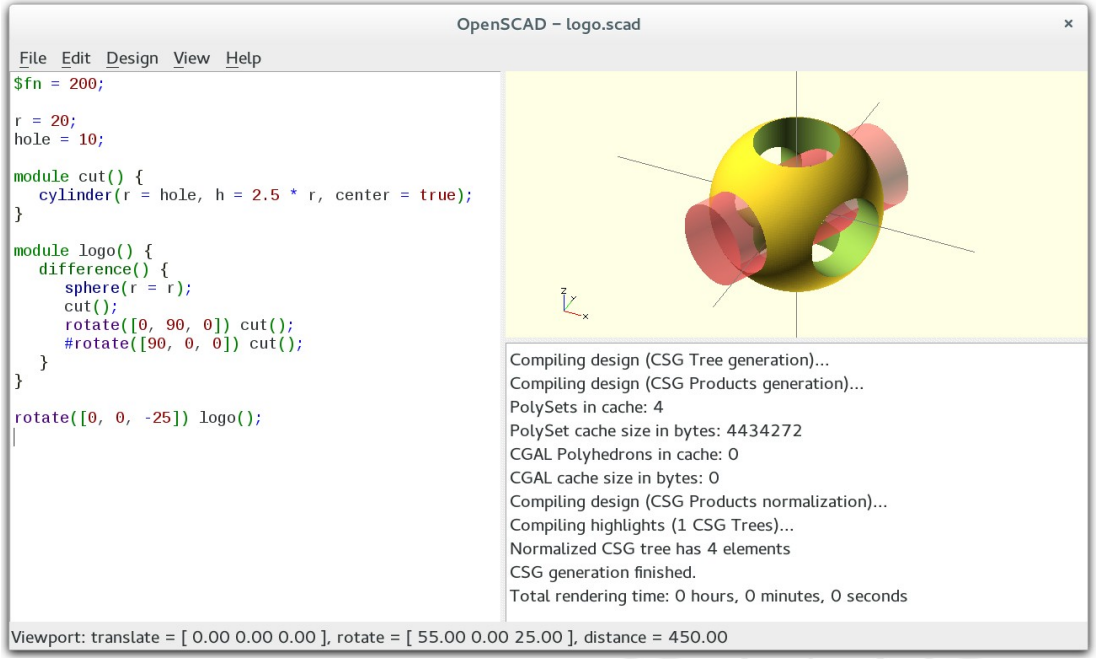
LibreCAD

- 2D-only
- Digital drawing board
- Useful for laser-cutting
- 3D printing obviously out of reach



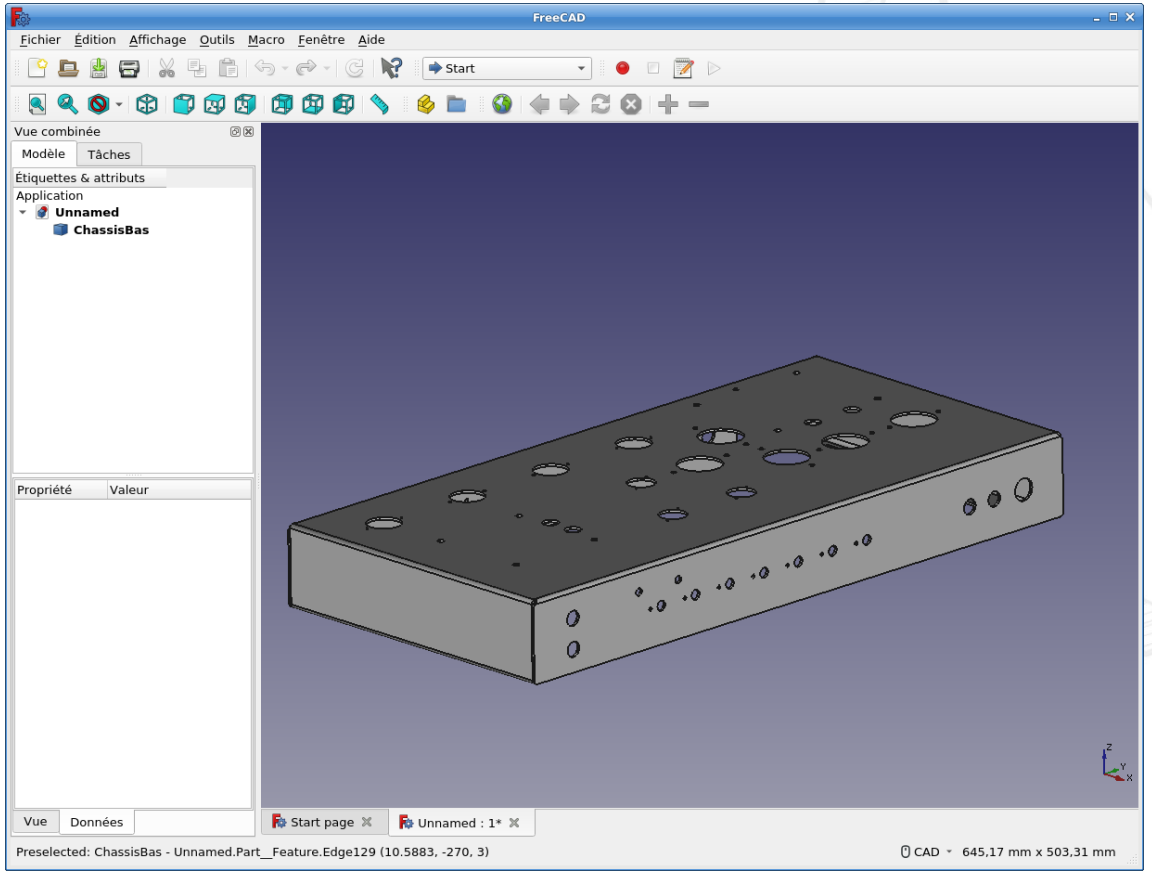
OpenSCAD

- Software developer's mechanical CAD
- Code your own shape + 3D preview
- Powerful but not exactly user-friendly



FreeCAD

- Parametric 3D modeling
- User interface close to industry standards
- Classical workflow (sketch → shape)



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Questions?

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Thank you!

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